



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

09/904,105

07/13/2001

Toshiki Tachikawa

107292-00023

1324

4372

7590

08/28/2003

ARENT FOX KINTNER PLOTKIN & KAHN
1050 CONNECTICUT AVENUE, N.W.
SUITE 400
WASHINGTON, DC 20036

EXAMINER

NGUYEN, LAM S

ART UNIT

PAPER NUMBER

2853

DATE MAILED: 08/28/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/904,105

Applicant(s)

TACHIKAWA ET AL.

Examiner

LAM S NGUYEN

Art Unit

2853

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 June 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 7-10 is/are allowed.
- 6) ☒ Claim(s) 1 and 3-6 is/are rejected.
- 7) ☒ Claim(s) 2 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 13 July 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3,6.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1, 3/1, and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pu (US 6034377) in view of Badura et al. (US 6597005).

Pu discloses a charged-particle beam irradiator comprising a scan electromagnet (Fig. 10, element 17) provided on an entrance side of a final deflection electromagnet (FIG. 10, element 19) to scan a charged-particle beam to expand an irradiation field, wherein kicks provided by the plurality of said scan electromagnets are superimposed to form a collimated irradiation field (FIG. 10: the field comes out at the exit of element 19 and enters the element 21) at an exit of said final deflection electromagnet (FIG. 10, element 19).

Pu does not disclose wherein the charged-particle beam irradiator comprising a plurality of scan electromagnets provided on an entrance side of a final deflection electromagnet, interposed between said final deflection electromagnet and a deflection electromagnet disposed on an entrance thereof (**Referring to claim 3/1**), disposed upstream from said deflection electromagnet at an entrance thereof (**Referring to claim 4**), and disposed independent of each other in X and Y directions (**Referring to claim 5**).

Badura et al. disclose an ion beam system comprising a plurality of scan electromagnets (Fig. 2, element 13, 14) provided on an entrance side of a final deflection electromagnet (Fig. 2,

Art Unit: 2853

element 7 (next to element 16)) and interposed between the final deflection electromagnet (Fig. 2, element 7 (next to element 16)) and a deflection electromagnet (Fig. 2, element 7 (in the middle)) disposed on an entrance thereof (**Referring to claim 3/1**).

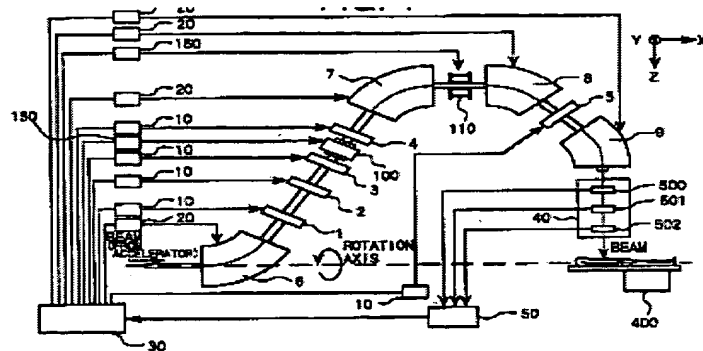
Therefore, it would have been obvious for one having ordinary skill in the art at the time the invention was made to replace the single scan electromagnet in the charge particle beam irradiation apparatus disclosed by Pu by a plurality of scan electromagnets provided on an entrance side of a final deflection electromagnet and interposed between the final deflection electromagnet and a deflection electromagnet disposed on an entrance thereof as disclosed by Badura et al. The motivation of doing so is to allow the ion beam after emerging from the last deflection magnet to be able to scan a specific area surrounding the isocenter in agreement with a predefined treatment plan as taught by Badura et al. (column 6, line 29-37).

2. Claims 4/3/1 and 5/1 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pu (US6034377) in view of Badura et al. (US 6597005) as applied to claims 1, 3/1, and 6, and further in view of Akiyama et al. (US 6218675).

Pu, as modified, discloses the claimed invention as discussed above, except wherein said plurality of scan electromagnets disposed independent of each other in X and Y directions are disposed upstream from said deflection electromagnet at an entrance thereof.

Akiyama et al. disclose a charged particle beam irradiation apparatus including plurality of scan electromagnets (FIG. 4, elements 100, 110) disposed independent of each other in X and Y directions are disposed upstream from a deflection electromagnet (FIG. 4, element 8) at an entrance thereof.

Art Unit: 2853



Therefore, it would have been obvious for one having ordinary skill in the art at the time the invention was made to include plurality of scan electromagnets disposed upstream from said deflection electromagnet as disclosed by Akiyama et al. into the charged particle beam irradiation apparatus disclosed by Pu, as modified. The motivation of doing so is to reduce the power consumption of a scanning electromagnet by narrowing the gap between magnetic poles of the scanning electromagnet as taught by Akiyama et al. (column 1, line 64-67).

Allowable Subject Matter

3. Claims 7-10 are allowed and claims 2, 3/2, 4/3/2, and 5/2 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Referring to claims 2 and 7: The most pertinent art Pu (US 6034377) and Badura et al. (US 6597005) fail to disclose wherein said plurality of scan electromagnets are arranged according to following equation.

$$a_{11}(S_1) * X_1' + a_{11}(S_2) * X_2' + \dots + a_{11}(S_n) * X_n' = 0$$

where, n : number of the electromagnets.

$S_1 \dots S_n$: distance from each electromagnet to beam irradiated position

$a_{11}(S)$: coefficient of beam transport matrix

X': beam divergence at the beam irradiated position

Therefore, the claimed invention is not disclosed by the cited prior art.

Referring to claims 3/2, 4/3/2, 5/2, 8-10: Allowable since their dependence on claims 2 and 7.

Response to Arguments

Applicant's arguments with respect to claims 1 and 6 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LAM S NGUYEN whose telephone number is (703)305-3342. The examiner can normally be reached on 7:00AM - 3:30PM.

Art Unit: 2853

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, STEPHEN D. MEIER can be reached on (703)308-4896. The fax phone numbers for the organization where this application or proceeding is assigned are (703)305-3431 for regular communications and (703)305-3432 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.

LN

August 14, 2003


Stephen D. Meier
Primary Examiner